In the Claims:

Please amend claims 1, 3, 9, 11, 17, and 18. The claims are as follows.

1. (Currently amended) A diode structure, comprising:

a substrate layer comprising a semiconductor material and first doping impurities with a first ~~charge~~ doping polarity;

a first layer having an opening, the first layer being on top of and in direct physical contact with the substrate layer, the first layer ~~comprising the~~consisting of only one piece of continuously distributed semiconductor material and second doping impurities with a second ~~charge~~ doping polarity, the second ~~charge~~ doping polarity being opposite to the first ~~charge~~ doping polarity;

a second layer being on top of and in direct physical contact with the first layer, the second layer comprising the semiconductor material and third doping impurities with the second ~~charge~~ doping polarity, the first layer having a higher doping concentration than the second layer, wherein the second layer is in direct physical contact with the substrate layer through the opening of the first layer; and

an electrode structure being on top of and in direct physical contact with the second layer, the electrode structure including at least an anode and a cathode of the diode structure.

2. (Previously presented) The structure of claim 1, wherein the cathode of the electrode structure is in direct physical contact with the first layer.

3. (Currently amended) The structure of claim 1, wherein the anode of the diode structure is

doped with the first-charge doping polarity and the cathode of the diode structure is doped with the second ~~charge~~ doping polarity.

4. (Previously presented) The structure of claim 1, wherein a breakdown voltage of the diode structure is a function of a size of the opening, and wherein the opening is formed with a predetermined size configured to achieve a given value of the breakdown voltage of the diode structure.

5. (Original) The structure of claim 1, wherein at least one STI (Shallow Trench Isolation) region is formed between the anode and the cathode.

6. (Original) The structure of claim 1, further comprising a plurality of deep trenches isolating the diode structure.

7. (Original) The structure of claim 1, wherein the first layer is configured to expand and fill the opening at high temperature.

8. (Original) The structure of claim 1, wherein the first doping impurities are P type, and the second and third doping impurities are N type.

9. (Currently amended) A method for forming a diode structure, the method comprising the steps of:

providing a substrate comprising a semiconductor material and first doping impurities with a first ~~charge~~ doping polarity;

implanting in the substrate second doping impurities with a second ~~charge~~ doping polarity to form a first layer with an opening, the opening comprising the semiconductor material and not comprising the second doping impurities;

implanting in the substrate third doping impurities with the second ~~charge~~ doping polarity to form a second layer on top of and in direct physical contact with the first layer, the first layer having a higher doping concentration than the second layer; and

forming an electrode structure on top of and in direct physical contact with the second layer, the electrode structure including at least an anode and a cathode.

10. (Original) The method of claim 9, further comprising the step of extending the electrode structure down in direct physical contact with the first layer.

11. (Currently amended) The method of claim 9, wherein the anode is doped with the first-charge doping polarity and the cathode is doped with the second ~~charge~~ doping polarity.

12. (Original) The method of claim 9, wherein the step of implanting in the substrate the second doping impurities comprises the step of forming the opening at a predetermined size configured to achieve a given breakdown voltage of the diode structure.

13. (Original) The method of claim 9, further comprising the step of forming at least one STI

(Shallow Trench Isolation) region between the anode and the cathode.

14. (Original) The method of claim 9, further comprising the step of forming a plurality of deep trenches isolating the diode structure.

15. (Original) The method of claim 9, wherein the step of implanting in the substrate the second doping impurities comprises the step of expanding the first layer at high temperature to fill the opening.

16. (Original) The method of claim 9, wherein the first doping impurities are P type, and the second and third doping impurities are N type.

17. (Currently amended) A diode structure, comprising:

a substrate layer comprising a semiconductor material;

a first layer having an opening, the first layer being on top of and in direct physical contact with the substrate layer, the first layer ~~comprising the~~consisting of only one piece of continuously distributed semiconductor material and first doping impurities with a first ~~charge~~ doping polarity; and

a second layer being on top of the first layer, the second layer comprising the semiconductor material and second doping impurities with ~~a second charge~~ the first doping polarity, ~~the second charge polarity being opposite to the first charge polarity,~~ wherein the second layer is in direct physical contact with the substrate layer through the opening of the first

layer.

18. (Currently amended) The diode structure of claim 17, further comprising a third layer extending from the surface of the substrate down in direct physical contact with the first layer, the third layer comprising the semiconductor material and third doping impurities with the first charge doping polarity and being separate from the second layer.

19. (Original) The diode structure of claim 18, wherein the second layer and the third layer are used as two electrodes of the diode structure.

20. (Original) The diode structure of claim 17, wherein the opening is formed with a predetermined size configured to achieve a given value of the breakdown voltage of the diode structure.